**********FLIGHT STANDARDS BULLETIN**********

BULLETIN NUMBER 2

TASK: Landing an Airplane

SUBTASKS: Traffic pattern Operations

OBJECTIVE: To develop awareness and procedures to aid in avoiding a landing acc ident.

STANDARDS: N/A

CONDITIONS: N/A

DESCRIPTION: 1. The Facts

Approximately 75% of all aircraft accidents are pilot related (pilot error plays a role in the accident). Of the pilot related accidents, 39% have occurred in the approach and landing phase of flight. The FAA is determined to reduce this percentage.

2. What can you do?

We offer the following suggestions to the flight instructor when teaching a student:

TRAFFIC PATTERN OPERATIONS

A. Ensure that the landin g distance available is adequate. Consult the appropriate landing distance chart and consider the following:

1. Density Altitude.

2. Wind direction and velocity.

3. Slope of runway, if any.

4. Condition of the runway (snow, sand, mud, tall grass, etc..)

B. Plan the entry to the traffic pattern well in advance of arriving at the downwind. Plan a landing into the wind or as close to a headwind, if possible.

C. Complete the pre-landing checklist prior to entering the pattern. (This will allow you to concentrate on the traffic pattern procedures and collision avoidance.)

D. Plan to touchdown beyond the runway's approach threshold, but well within the first one-third portion of the runway.

E. Enter the traffic pattern as suggested in the Aeronautical Information Manual (AIM). (This involves entering midfield at a 45° angle and the aircraft should be at traffic pattern altitude.)

Downwind

A. Fly the downwind ½ to 1 mile from the runway.

B. Correct for wind drift, as appropriate. It is important to be situationally aware of any wind drift. Use all available resource such as ATIS, AWOS, ASOS, windsock, smoke, etc. to determine the wind direction and velocity. The sooner the drift is discovered the more time the pilot has to prepare.

CAUTION: If wind drift is not corrected early into the approach, the aircraft could drift closer to the runway than desired causing the pilot to overshoot on the turn from base to final. Some pilots may use overbanking or a skidding turn rather than overbanking, setting up the aircraft for the classic stall-spin scenario.

C. Report downwind on the appropriate frequency.

D. Remain within ±100 of traffic pattern altitude when entering and while on downwind.

E. When the airplane is abeam the touchdown point, the pilot should begin slowing the airplane for the approach to landing. In addition, this may be a good time to verify the landing gear is down and lock as well as lowering approach flaps.

F. When following another aircraft in the pattern allow for adequate spacing.

RULE OF THUMB: When following another aircraft in the pattern the pilot must consider the other aircraft's speed and distance from the runway before turning base. A rule of thumb would be

to remain on downwind until the aircraft (of simuilar speed) that you are following is abeam your position before turning the base leg.

Base

A. Turn the base leg when the touchdown point is at the 45° position behind the wing. This may not be possible when following another aircraft.

B. Maximum bank angle should not exceed 30° while operating in the traffic pattern.

CAUTION: It is recommended that the angle of bank not exceed a medium bank because the steeper the angle of bank, the higher the airspeed at which the airplane stalls.

C. When wings are level on the base leg, visualize the remaining approach to determine wind correction and/or power adjustment. The pilot may lower additional flaps so as to prepare for the slowdown to final approach airspeed.

CAUTION: Full flaps are not recommended until the final approach is established and landing assured.

D. Continue the base leg to a point where a medium to shallow-bank turn will align the airplane's path directly with the centerline of the landing runway.

Final

A. Plan the turn final as to not under/overshoot the extended centerline of the runway.

NOTE: If a crosswind condition exists for the landing runway, the pilot should expect a tailwind or headwind on the base leg and correct appropriately. If the condition is a headwind, the pilot should delay the turn and/or use a shallower bank than normal so as to roll out on final on the runway extended centerline. If the condition is a tailwind the pilot should begin the turn to final early and/or use a steeper than normal (NOT TO EXCEED 30° OF BANK ANGLE) so as to roll out on final on the extended centerline.

B. Airspeed control is very important at this point in the approach. Use the manufacture's recommended airspeed. In the

absences of the manufacture's recommended airspeed use 1.3 Vso (1.3 X Vso calabrate converted to indicated airspeed).

RULE OF THUMB: Most manufacture's recommended approach airspeeds are based on the airplane being at maximum gross weight. A rule of thumb is to reduce the calibrated approach airspeed for the maximum weight of your airplane by one-half of the percentage of the weight decrease. For example: a weight reduction of 20% from maximum gross weight will decrease approach speed 10% from the recommended calibrated approach airspeed.

CAUTION: If the airplane's approach speed is just 10 knots faster than recommended, this could cause an increase in the roll out distance to be 21% greater. If the approach speed is 20 knots faster than recommended, this would cause an increase in roll out distance of approximately 96% or almost double that normally required. This condition may be caused by the pilot's inattention to his/her airspeed, ATC requesting the pilot to keep the airspeed high on final, or a tailwind on landing.

C. Turbulent-air approach and landings are usually performed at the normal approach speed plus one-half the wind gust factor. Example: If the normal approach speed is 60 knots and the wind is 15 gusting to 25 knots, the gust factor is 10 knots. The final approach airspeed for this condition would be 65 knots.

D. The pilot should determine the aimpoint based on the touchdown point. The aim point is your imaginary bulls-eye on the runway, the reference point at the end of your selected glide path, not the actual touchdown point.

E. To approximate the distance between the touchdown point and the aim point, the pilot can use the formula three (3) feet ahead of the touchdown point for each knot of groundspeed. (Example: If the groundspeed on final is 60 knots the aimpoint would be 180 feet ahead of the touchdown point.)

F. If a crosswind exists, the pilot should initially use a crab method to correct for the wind drift. As the airplane approaches the approach end of the runway the pilot should transition to the wing-low method.

G. To establish the wing-low method of crosswind correction, hold the aileron into the wind to correct for drift while applying opposite rudder to keep the airplane's longitudinal axis aligned with the centerline of the runway. Depending on the experience and proficiency of the pilot, this wing-low method of crosswind landing can begin as early as ½ mile from the touchdown point to as late as roundout and flare.

H. The descent angle should be controlled throughout the approach so that the airplane will land in the center of the first third of the runway.

I. The objective of a good final approach is to descend at an angle and airspeed that will permit the airplane to clear all obstacles in the approach path and reach the desired touchdown point at an airspeed that will result in a minimum of floating just before touchdown.

CAUTION: Never try to stretch a glide by applying back elevator pressure alone to reach the desired landing spot. This will shorten the gliding distance if power is not added simultaneously.

Roundout/Flare

A. At approximately 10 to 20 feet above the surface (the height of most windsocks) the pilot should begin to increase the pitch attitude to a nose level attitude. This will cause a slow down in the descent rate and the airplane's forward speed.

B. To keep the airplane aligned with the runway, the pilot should look straight down the runway, or slightly to the left of the nose in airplanes with very nose high landing attitudes, and use his/her peripheral field of vision to determine the height above the runway.

C. If a crosswind exists, the pilot should hold the ailerons into the wind to correct for drift and apply opposite rudder to keep the airplane longitudinal axis aligned with the centerline of the runway. As airspeed decreases, the airplane's control effectiveness decreases. (This will require the pilot to apply more control input to counteract the crosswind.)

Hold-off

A. As the airplane's forward speed begins to slow the pilot should bring his/her focus closer to the airplane.

B. As the airplane gets closer to the runway surface the pilot must continue to slow the airplane's descent rate, it's forward speed and attain a nose high attitude in order to land on the main gear wheels only. This is accomplished by a continual increase in elevator back-pressure.

C. The above HOLD-OFF procedure will continue throughout the airplane touching down on the runway in a nose high attitude and the airspeed has reached the stall speed.

Touchdown

A. Touchdown on the first one-third of the runway. If unable to do so, execute a go-around.

B. Upon touchdown the main gear wheels must touchdown first (tricycle gear airplanes) this will cause the nose to pitch forward, the pilot must anticipate this and hold back elevator pressure.

Roll-out

A. As the speed decreases the elevator control will become less effective and the nose will contact the runway. Holding the elevator up during the roll-out will initially provide some aerodynamic braking.

B. Apply brakes, if necessary, after all three wheels are on the runway and the airplane has slowed to at least 25 percent below the touchdown speed. (The immediate use of brakes after touchdown is not recommended.)

NOTE: For most airplanes aerodynamic drag is the single biggest factor in slowing the airplane in the first quarter of its speed decay. Brakes become increasingly effective as airspeed and lift decreases.